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mitted to the cylinder. At what pressure is the steam when admitted to the cylinder? What is the temperature of the steam for this pressure? (See curve of steam pressure.) Does the maximum pressure recorded on the indicator card correspond to that registered by the steam gauge? During what fraction of a stroke is the maximum pressure upon the piston exerted? (See indicator card.)

Ascertain the internal dimensions of the cylinder. What is the temperature and what the pressure of the exhaust steam?

How many units of heat disappear as the quantity of steam which enters the cylinder at one time expands to the temperature and pressure at the close of the stroke? (For final pressure see indicator diagram.) How many units of heat disappear as the quantity of steam which enters the cylinder at one time expands to the temperature and pressure of the exhaust steam? (In what other ways has heat disappeared?) What efficiency do these figures indicate?

Count the number of strokes per minute, and determine the average pressure of steam in the cylinder. (See indicator diagram.) What horsepower is the engine developing?

If the exhaust steam were conducted to another cylinder attached to the same shaft and all the heat which escapes to the exhaust were utilized in this second cylinder, how many times larger should the area of the piston be than that of the first, the length of stroke in the two engines being the same?

Assuming the boiler at this plant to have the same efficiency as that of the boilers at the college heating plant, and omitting further loss by radiation from the steam pipes, what part of the energy developed in the burning of a pound of coal actually appears as work?

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ARGUMENTS ALLEGED AGAINST THE DOCTRINE OF ORGANIC EVOLUTION.

TO THE EDITOR OF SCIENCE: It is not often that in a single article emanating from good authority, one is able to find, in concise form, many of the so-called arguments of the anti-evolutionist against the theory of the animal descent of man. One of the most typical and most recent of these expositions upon the relation of belief in this theory, with Biblical teachings and established scientific facts, to-

gether with what purports to be a registration of vital points which would make a belief in the evolution theory incredible, has come from Professor L. T. Townsend, of Drew Theological Seminary, in an address entitled, 'The Collapse of Evolution,' delivered recently before the American Bible League, at the Boston convention.

This exposition appears to give in brief form, an excellent idea of the attitude of the average anti-evolutionist in respect to some of the fundamental principles of the descent theory (especially from the theological standpoint). Believing that there may be some of your readers who would appreciate a concise statement of this attitude, and of the arguments which so many of the more conservative anti-evolutionists of theological profession hold towards certain phases of this much troubled question, I have ventured to enclose to you in brief, argumentative form (although the address does not readily lend itself to such arrangement) an account of this article which, so far as I am aware, has appeared only in a periodical of limited circulation, *The Bible Student and Teacher*; and which, to my mind, shows the theological anti-evolutionist's standpoint in a definite and concise manner.

I undertake at this time no criticism of any part of Professor Townsend's argument, but attempt merely to state the argumentative points of the address in the clearest and most logical sequence possible. That many points require criticism will be apparent to the most casual reader; that, however, I leave to others. The following is the gist of the argument:

ASSERTION.

The theory of evolution and the animal descent of man is a poorly constructed affair, supported by not one single well-established fact in science, philosophy or religion, for:

- I. The assertion that the original germs of animal life do not require the supernatural is false, for:
 1. Natural forces to-day can not produce the same germs.
 2. Spontaneous generation, in any sense, is not proved possible at the present day, 'and is no longer mentioned in scientific circles.'

3. Many famous biologists have abandoned the theories of the natural origin of life, for:
 - A. Huxley was led reluctantly to give up his bioplastic theory.
 - B. Sir William Thomson surrendered his speculation that life germs came to this earth from some planet.
 - C. Herbert Spencer abandoned his theory of the 'chemical origin of life.'
 - D. Tyndall said: 'Proofs that spontaneous generation has occurred at any time in the earth's history, are still wanting.'
 - E. Virchow held that there was no evidence that the original germs arose by spontaneous generation.
- II. There is no truth in the law of universal development and improvement of animals, for:
 1. From the 'primordeale zone' to the present, the multitude of species have shown no improvement since their creation, for:
 - A. The marine algæ found to-day are no more perfect than those found in the distant Silurian period.
 - B. Among trees, the oak, birch, hazel, Scotch fir, have shown no improvement in thousands of years.
 - C. The coral 'insects' which built the first coral reefs in Florida, have shown no improvement in 300 centuries.
 - D. The crustacean family, since its appearance at the close of the carboniferous period, has not changed.
 - E. The molluscs, fishes, reptiles, birds and mammals have never shown the least improvement or elaboration since their appearance.
 - F. Mummies of cats, bulls, ibices, birds, dogs and crocodiles from the tombs of Egypt, have shown no change in 5,000 years; are identical with their living representatives of to-day.
 - G. The 'Cro-Magnon' skull belonging to the earliest stone age, is not different from the human skulls of to-day.
 - H. A scientist, having examined the statuettes recently discovered in Crete, concludes that the muscles and veins of the forearm of man have not changed in 4,000 years.
 2. On the other hand, in scores of instances there is a pronounced deterioration of both parts and functions, for:
 - A. One may observe cases of degeneration in:
 - a. The acidians.
 - b. Many parasitic species.
 - c. The fishes (constant degeneration since the Devonian period).
 - d. All the lower mammals.
 - e. The whole human race.
- III. There is no such thing as transmutation of species by natural processes, for:
 1. The proofs which evolutionists have brought forward in favor of transmutation are in reality, meaningless, for:
 - A. Geological records do not uphold the theory, for:
 - a. In such cases as the supposed phylogeny of the horse, the resemblances between the original four-toed animals and the modern horse, 'are no greater than those between a cow and a crow, or between a man and a mouse; and this is no evidence of transmutation.'
 - b. The so-called missing link, *Pithecanthropus erectus*, is no evidence, for:
 - a'. At the meeting of famous zoologists at Leyden, only seven out of twenty-four agreed that the '*Pithecanthropus*' was a missing link.
 - b'. Professor D. C. Cunningham, of Dublin, concluded that this lot of bones was part baboon and part human.
 - B. Biological records do not uphold the theory of transmutation, for:
 - a. Manifestations of the principle of the biogenetic law furnish no support for the theory, for:
 - a'. This law but shows the 'prophetic element in nature'; *i. e.*, the creator is a prophet and his method is to anticipate by type, pattern or prophecy, what may be expected in his subsequent creations.
 - b. The ease with which present-day scientists can place in its proper class and order any fossil or prehistoric animal, is a sign that species have not changed.
 - c. No one has ever been able to change the structureless germ of one plant or animal into the structureless germ of another.
 - d. Sterility of the offspring of crossed species bars the most available way for the process of transmutation to act.
- IV. There is no emergence of man from the brute condition, for:
 1. Geology, history, archeology, anatomy, philology, ethics and religion demonstrate the fact that the first beings on earth which

were the human form were not brutes nor even barbarians, but were as perfect in brain and as capable in intellect as any people now living, for:

A. Geology, archeology and anthropology all concur in the facts that:

- a. The human race was not existent before the close of the glacial period; *i. e.*, about 15,000 years ago.
- b. Man was highly civilized 7,000 years ago, and has not materially changed since that time.
- c. There is left only 8,000 years for the rise of man from the brute condition—a fact which is incredible when we note that man has not changed at all in the last 7,000 years.

B. Philological research demonstrates the fact that the languages of all primitive tribes have undergone a descent rather than an ascent.

C. A study of comparative religion shows that all forms of worship emanated from a true worship of one supreme being.

D. The ethical codes of the ancient Babylonians and Egyptians excelled in loftiness and purity ours of the present day, which have degenerated.

V. The scholars and scientists are not all evolutionists, for:

1. Dr. N. S. Shaler, of Harvard University, says: 'It begins to be evident to naturalists that the Darwinian hypothesis is still unverified. Notwithstanding the evidence derived from animals and plants under domestication, it has not been proved that a single species * * * has been established by the operation of natural selection.'
2. St. George Mivart, of the University College, Kensington, says of the theory: 'I can not call it anything but a puerile hypothesis.'
3. Dr. Etheridge, of the British Museum, remarks: 'Nine tenths of the talk of evolutionists is sheer nonsense; it is not founded by observation, and wholly unsupported by fact.'
4. L. S. Beale, of King's College, London, says: 'There is no evidence that a man has descended from, or is or was in any way specially related to, any other organism, in

nature, through evolution or any other process.'

5. M. Stanislas Meunier, of the Paris Museum, argues in favor of special creation by an infinite power.
6. Virchow, speaking of evolution, said: 'It is all nonsense. It can not be proved by science that man descends from the ape or from any other animal.'
7. Fleishmann, of Erlangen, said: 'The Darwinian theory of descent has not a single fact to confirm it. It is a product of the imagination.'
8. Edward von Hartmann in his work, 'The Passing of Darwinism,' shows that the theory is now incredible.
9. Dr. A. H. Sayes, of Oxford, says: 'The application of the evolution theory to the religious and secular history of the world, is founded on a huge mistake.'
10. Many others, as Donnert, Goette, Hoppe, Paulsen, Rutermeier, Wundt, Zoeckler and Griefswald, once supporters of evolution, have now abandoned it.

CONCLUSION.

In view of the facts:

1. That the advocates of evolution can not prove that life germs arose by natural processes;
2. That evolutionists show an utter inability to prove that there exists a universal law of development and improvement;
3. That they can not prove lower species of plants can be transmuted into higher;
4. That in all excavations not a single connecting link between species has been discovered;
5. That physical and mental science proves it to be impossible for an animal to come into possession of a human soul, human mind or human body;
6. That geologists have silenced the voices of the advocates of the animal descent of man;
7. That all scholarly men and scientists are not evolutionists;
8. That many who once upheld evolution are now abandoning it;

There need not be a moment's hesitation in saying that the hypothesis of evolution, with all the other speculations attached to it, has collapsed beyond the hope of restoration.

PHIL. B. HADLEY.

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March 4, 1905.

¹ This is a misinterpretation of Dr. Shaler's attitude which is decidedly in favor of some evolution hypothesis.—P. B. H.